2024

DRINKING WATER SURVEILLANCE PROGRAM

STONEY POINT (TILBURY NORTH) WATER SUPPLY SYSTEM

ANNUAL REPORT 1990

Environment Environnement

ISSN 0839-8933

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DRINKING WATER SURVEILLANCE PROGRAM

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JULY 1992

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93-01953/

EXECUTIVE SUMMARY

DRINKING WATER SURVEILLANCE PROGRAM

STONEY POINT (TILBURY NORTH) WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Stoney Point (Tilbury North) water supply system is a conventional treatment plant which treats water from Lake St. Clair. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration (using pressure filters) and disinfection. This plant has a rated capacity of 3.1 x 1000 m^3/day. The Stoney Point (Tilbury North) water supply system serves a population of approximately 3,500.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No known health related guidelines were exceeded.

The Stoney Point (Tilbury North) water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS)

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE
A '.' INDICATES THAT NO SAMPLE WAS TAKEN

SCAN	SITE RAW			TREATED			SITE 1		
	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE	TESTS	POSITIVE	%POSITIVE
BACTERIOLOGICAL	21	11	52	7	0	0	6	3	50
CHEMISTRY (FLD)	21	21	100	41	40	97	71	65	91
CHEMISTRY (LAB)	133	114	85	153	113	73	241	203	84
METALS	168	71	42	168	45	26	299	107	35
CHLOROAROMATICS	98	0	0	84	0	0	98	0	0
CHLOROPHENOLS	12	0	0	12	0	0	.	.	.
PAH	118	0	0	118	0	0	17	0	0
PESTICIDES & PCB	239	2	0	205	1	0	150	0	0
PHENOLICS	7	0	0	7	1	14	.	.	.
SPECIFIC PESTICIDES	57	0	0	76	0	0	7	0	0
VOLATILES	203	0	0	203	28	13	203	30	14
TOTAL	1077	219		1074	228		1092	408	

DRINKING WATER SURVEILLANCE PROGRAM

STONEY POINT (TILBURY NORTH) WATER SUPPLY SYSTEM
1990 ANNUAL REPORT

INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Stoney Point (Tilbury North) water treatment plant in the spring of 1985 as part of a survey of the St. Clair/Detroit River area. Previous DWSP annual reports have been published for 1986, 1987, 1988 and 1989.

PLANT DESCRIPTION

The Stoney Point (Tilbury North) water supply system is a conventional treatment plant which treats water from Lake St. Clair. The process consists of coagulation, flocculation, clarification (upflow clarifier), filtration (using pressure filters) and disinfection. This plant has a rated capacity of 3.1 x 1000 m^3/day. The Stoney Point (Tilbury North) water supply system serves a population of approximately 3,500.

The sample day flows ranged from 1.1 x 1000 m^3/day to 2.0 x 1000 m^3/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to

make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the

method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

DISCUSSION

GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

IN THIS REPORT, DISCUSSION IS LIMITED TO:

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were reported above the guideline.

INORGANIC & PHYSICAL

CHEMISTRY (FIELD)

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance organisms and hence minimize associated taste, colour, odour and

corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 7 of 13 treated and distributed water samples with a maximum reported value of 24.0°C.

CHEMISTRY (LAB)

Elevated conductivity is often associated with high hardness levels.

Conductivity exceeded the European Economic Community Aesthetic Guideline Level of 400 umho/cm in 2 of 14 treated and distributed water samples with a maximum reported value of 342.0 umho/cm.

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 14 of 14 treated and distributed water samples with a maximum reported value of 148.0 mg/L.

METALS

The results of the metal scan showed that none were reported above any guideline.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatic scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenol scan showed that none were detected.

POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

Atrazine was found at positive levels in 1 of the 6 treated water samples analyzed. The maximum observed level was 670.0 ng/L. This was below the ODWO Interim Maximum Acceptable Concentration of 60,000 ng/L.

No other compounds, in the pesticide scan, were reported above trace levels.

PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOS recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

VOLATILES

Toluene was found at positive levels in 2 of the 14 treated and distributed water samples analyzed. The maximum observed level was 1.2 ug/L. This was below the ODWO Aesthetic Objective of 24 ug/L.

The detection of ethylbenzene, toluene and xylenes at trace levels and some positive levels in the distribution sample, but not in the raw or treated water may indicate that there was a source of contamination at this site. The present distribution system site was the local Co-op Store where gasoline and diesel equipment was stored.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Total THMs were found at positive levels in 12 of the 14 treated and distributed water samples analyzed. The maximum observed level was 62.1 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

CONCLUSIONS

The Stoney Point (Tilbury North) water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

STONEY POINT WATER TREATMENT PLANT

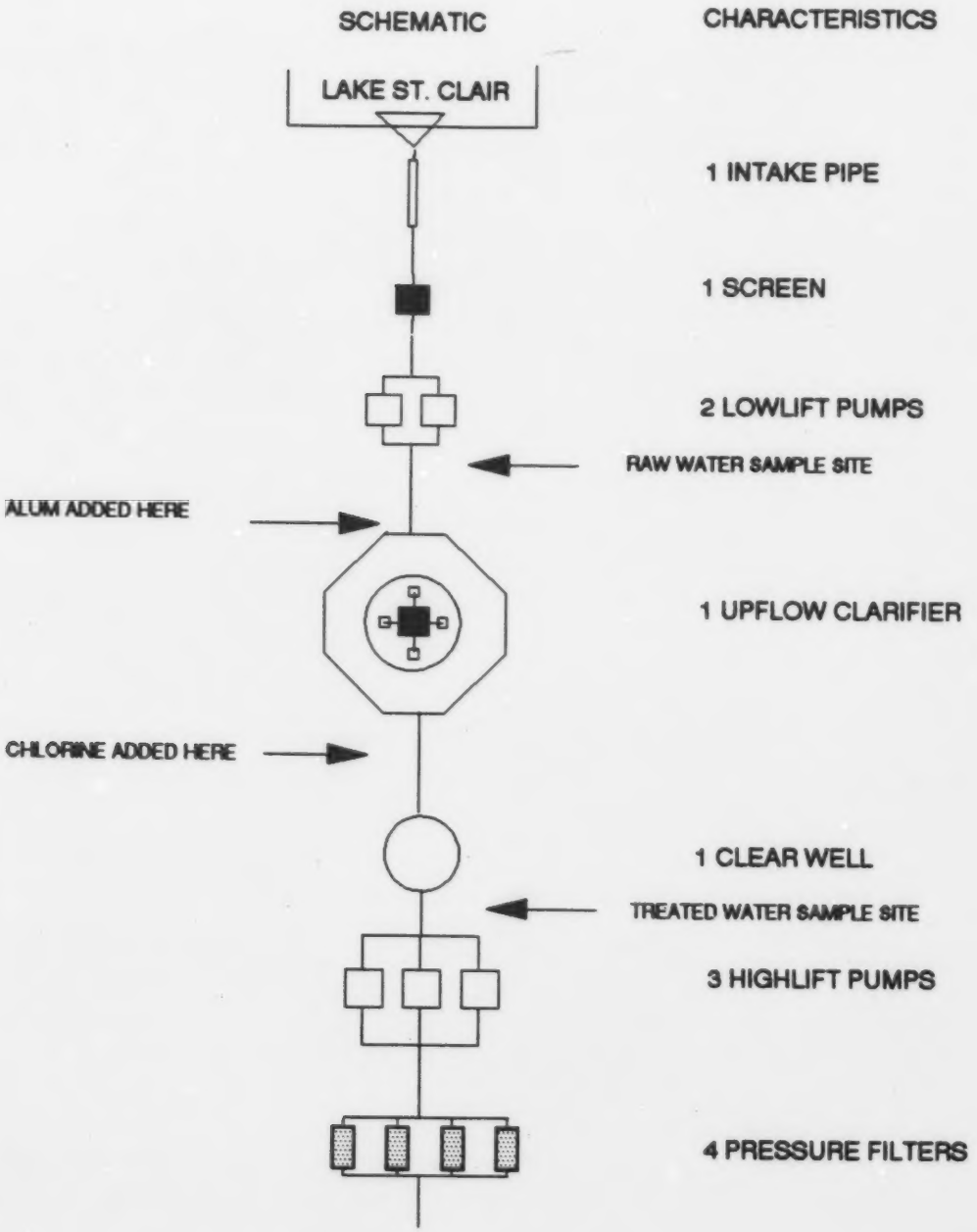

TABLE 1

DRINKING WATER SURVEILLANCE PROGRAM

PLANT GENERAL REPORT

WORKS #: 220003396
PLANT NAME: STONEY POINT (TILBURY NORTH WSS)

DISTRICT: WINDSOR
REGION: SOUTHWEST
DISTRICT OFFICER : J. DRUMMOND

UTM #: 1737208504687140

PLANT SUPERINTENDENT: LES HILLMAN

ADDRESS: 6011 ST. CLAIR RD., WEST
P.O. BOX 70,
STONEY POINT,ONTARIO
N0R 1N0
(519 798 3313)

MUNICIPALITY: TILBURY NORTH
AUTHORITY: MUNICIPAL

PLANT INFORMATION

PLANT VOLUME:	.907	(X 1000 M3)
DESIGN CAPACITY:	4.450	(X 1000 M3/DAY)
RATED CAPACITY:	3.180	(X 1000 M3/DAY)

MUNICIPALITY	POPULATION
TILBURY NORTH	3,155
TILBURY WEST	326

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

PARAMETER	LOCATION	FREQUENCY
FREE CHLORINE RESIDUAL	AFTER FILTERS	EVERY 6 HOURS
PH	TREATED WATER	DAILY READING
TEMPERATURE	RAW WATER	DAILY READING
TURBIDITY	TREATED WATER	DAILY READING

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) SAMPLE DAY CONDITIO 1990

			TREATMENT CHEMICAL DOSAGES (MG/L)	
			POST CHLORINATION	COAGULATION
DATE	DELAY * TIME(HRS)	FLOW (1000M3)	CHLORINE	ALUM DRY
JUN 27	.50	.000	2.70	24.00
JUL 31	12.00	1.404	.62	32.00
SEP 04	15.00	2.046	1.50	24.00
SEP 25	24.00	1.111	.27	29.00
OCT 23	20.00	1.430	1.50	28.00
NOV 20	24.00	1.359	1.60	25.00
DEC 18	24.00	1.426	1.59	25.00

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
BACTERIOLOGICAL									
FECAL COLIFORM MF	7	2	0	.	.	.	.	.	.
STANDRD PLATE CNT MF	.	.	.	7	0	0	6	3	0
TOTAL COLIFORM MF	7	2	0	.	.	.	.	.	.
T COLIFORM BCKGRD MF	7	7	0	.	.	.	.	.	.
*TOTAL GROUP BACTERIOLOGICAL	21	11	0	7	0	0	6	3	0
CHEMISTRY (FLD)									
FLD CHLORINE (COMB)	.	.	.	6	5	0	11	5	0
FLD CHLORINE FREE	.	.	.	7	7	0	13	13	0
FLD CHLORINE (TOTAL)	.	.	.	7	7	0	11	11	0
FLD PH	7	7	0	7	7	0	12	12	0
FLD TEMPERATURE	7	7	0	7	7	0	12	12	0
FLD TURBIDITY	7	7	0	7	7	0	12	12	0
*TOTAL SCAN CHEMISTRY (FLD)	21	21	0	41	40	0	71	65	0
CHEMISTRY (LAB)									
ALKALINITY	6	6	0	7	7	0	12	12	0
CALCIUM	6	6	0	7	7	0	13	13	0
CYANIDE	7	0	0	7	0	3	.	.	.
CHLORIDE	6	6	0	7	7	0	13	13	0
COLOUR	6	5	1	7	0	6	13	0	10
CONDUCTIVITY	6	6	0	7	7	0	12	12	0
DISS ORG CARBON	6	6	0	7	7	0	13	13	0
FLUORIDE	6	6	0	7	7	0	13	13	0
HARDNESS	6	6	0	7	7	0	13	13	0
IONCAL	6	6	0	7	7	0	13	12	0
LANGELIERS INDEX	6	6	0	6	6	0	11	11	0
MAGNESIUM	6	6	0	7	7	0	13	13	0
SODIUM	6	6	0	7	7	0	13	13	0
AMMONIUM TOTAL	6	1	0	7	0	3	13	2	4
NITRITE	6	4	1	7	1	1	13	0	7
TOTAL NITRATES	6	5	0	7	7	0	12	12	0
NITROGEN TOT KJELD	6	6	0	7	7	0	13	13	0
PH	6	6	0	7	7	0	12	12	0
PHOSPHORUS FIL REACT	6	3	2	7	1	1	.	.	.
PHOSPHORUS TOTAL	6	6	0	7	0	5	.	.	.
SULPHATE	6	6	0	7	7	0	13	13	0
TURBIDITY	6	6	0	7	7	0	13	13	0
*TOTAL SCAN CHEMISTRY (LAB)	133	114	4	153	113	19	241	203	21

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
METALS									
SILVER	7	0	0	7	0	0	13	0	2
ALUMINUM	7	7	0	7	7	0	13	13	0
ARSENIC	7	0	7	7	0	5	13	0	13
BARIUM	7	7	0	7	7	0	13	13	0
BORON	7	4	3	7	5	2	13	10	3
BERYLLIUM	7	0	1	7	0	0	13	0	1
CADMIUM	7	0	0	7	0	1	13	0	1
COBALT	7	0	6	7	0	7	13	1	12
CHROMIUM	7	0	6	7	0	4	13	0	9
COPPER	7	6	1	7	1	6	13	4	9
IRON	7	5	2	7	0	1	13	0	2
MERCURY	7	1	0	7	1	0	.	.	.
MANGANESE	7	6	1	7	1	4	13	3	10
MOLYBDENUM	7	5	2	7	7	0	13	13	0
NICKEL	7	0	5	7	0	3	13	0	11
LEAD	7	4	2	7	0	3	13	8	5
ANTIMONY	7	1	6	7	7	0	13	9	4
SELENIUM	7	0	0	7	0	3	13	0	4
STRONTIUM	7	7	0	7	7	0	13	13	0
TITANIUM	7	4	3	7	0	7	13	3	10
THALLIUM	7	0	0	7	0	0	13	0	0
URANIUM	7	2	5	7	0	5	13	0	12
VANADIUM	7	6	1	7	0	7	13	4	9
ZINC	7	6	1	7	2	5	13	13	0
*TOTAL SCAN METALS	168	71	52	168	45	63	299	107	117
*TOTAL GROUP INORGANIC & PHYSICAL	322	206	56	362	198	82	611	375	138
CHLOROAROMATICS									
HEXACHLOROBUTADIENE	7	0	0	6	0	0	7	0	0
123 TRICHLOROBENZENE	7	0	0	6	0	0	7	0	0
1234 T-CHLOROBENZENE	7	0	0	6	0	0	7	0	0
1235 T-CHLOROBENZENE	7	0	0	6	0	0	7	0	0
124 TRICHLOROBENZENE	7	0	0	6	0	0	7	0	0
1245 T-CHLOROBENZENE	7	0	0	6	0	0	7	0	0
135 TRICHLOROBENZENE	7	0	0	6	0	0	7	0	0
HCB	7	0	0	6	0	0	7	0	0
HEXACHLOROETHANE	7	0	0	6	0	2	7	0	1
OCTACHLOROSTYRENE	7	0	0	6	0	0	7	0	0
PENTACHLOROBENZENE	7	0	0	6	0	0	7	0	0
236 TRICHLOROTOLUENE	7	0	0	6	0	0	7	0	0
245 TRICHLOROTOLUENE	7	0	0	6	0	0	7	0	0
26A TRICHLOROTOLUENE	7	0	0	6	0	0	7	0	0
*TOTAL SCAN CHLOROAROMATICS	98	0	0	84	0	2	98	0	1
CHLOROPHENOLS									

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
234 TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
2345 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
2356 T-CHLOROPHENOL	2	0	0	2	0	0	.	.	.
245-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
246-TRICHLOROPHENOL	2	0	0	2	0	0	.	.	.
PENTACHLOROPHENOL	2	0	0	2	0	0	.	.	.
*TOTAL SCAN CHLOROPHENOLS	12	0	0	12	0	0	0	0	0
PAH									
PHENANTHRENE	7	0	0	7	0	0	1	0	0
ANTHRACENE	7	0	0	7	0	0	1	0	0
FLUORANTHENE	7	0	0	7	0	0	1	0	0
PYRENE	7	0	0	7	0	0	1	0	0
BENZO(A)ANTHRACENE	7	0	0	7	0	0	1	0	0
CHRYSENE	7	0	0	7	0	0	1	0	0
DIMETH. BENZ(A)ANTHR	6	0	0	6	0	0	1	0	0
BENZO(E) PYRENE	7	0	0	7	0	0	1	0	0
BENZO(B) FLUORANTHEN	7	0	0	7	0	0	1	0	0
PERYLENE	7	0	0	7	0	0	1	0	0
BENZO(K) FLUORANTHEN	7	0	0	7	0	0	1	0	0
BENZO(A) PYRENE	7	0	0	7	0	0	1	0	0
BENZO(G,H,I) PERYLEN	7	0	0	7	0	0	1	0	0
DIBENZO(A,H) ANTHRAC	7	0	0	7	0	0	1	0	0
INDENO(1,2,3-C,D) PY	7	0	0	7	0	0	1	0	0
BENZO(B) CHRYSENE	7	0	0	7	0	0	1	0	0
CORONENE	7	0	0	7	0	0	1	0	0
*TOTAL SCAN PAH	118	0	0	118	0	0	17	0	0
PESTICIDES & PCB									
ALDRIN	7	0	0	6	0	0	7	0	0
ALPHA BHC	7	0	1	6	0	4	7	0	3
BETA BHC	7	0	0	6	0	0	7	0	0
LINDANE	7	0	0	6	0	0	7	0	1
ALPHA CHLORDANE	7	0	0	6	0	0	7	0	0
GAMMA CHLORDANE	7	0	0	6	0	0	7	0	0
DIELDRIN	7	0	0	6	0	0	7	0	0
METHOXYCHLOR	7	0	0	6	0	0	7	0	0
ENDOSULFAN 1	7	0	0	6	0	0	7	0	0
ENDOSULFAN II	7	0	0	6	0	0	7	0	0
ENDRIN	7	0	0	6	0	0	7	0	0
ENDOSULFAN SULPHATE	7	0	0	6	0	0	7	0	0
HEPTACHLOR EPOXIDE	7	0	0	6	0	0	7	0	0
HEPTACHLOR	7	0	0	6	0	0	7	0	0
MIREX	7	0	0	6	0	0	7	0	0
OXYCHLORDANE	7	0	0	6	0	0	7	0	0
OPDDT	7	0	0	6	0	0	7	0	0
PCB	7	0	0	6	0	0	7	0	0
DDD	7	0	0	6	0	0	7	0	0
PPDDE	7	0	0	6	0	0	7	0	0

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
PPDDT	7	0	0	6	0	0	7	0	0
AMETRINE	7	0	0	6	0	0	.	.	.
ATRAZINE	7	2	4	6	1	5	.	.	.
ATRATONE	7	0	0	6	0	0	.	.	.
CYANAZINE (BLADEX)	7	0	0	6	0	0	.	.	.
DESETHYLATRAZINE	7	0	1	6	0	0	.	.	.
D-ETHYL SIMAZINE	6	0	0	5	0	0	.	.	.
PROMETONE	7	0	0	6	0	0	.	.	.
PROPAZINE	7	0	0	6	0	0	.	.	.
PROMETRYNE	7	0	0	6	0	0	.	.	.
METRIBUZIN (SENCOR)	6	0	0	5	0	0	.	.	.
SIMAZINE	7	0	0	6	0	0	.	.	.
ALACHLOR (LASSO)	7	0	0	6	0	0	.	.	.
METOLACHLOR	7	0	0	6	0	0	.	.	.
HEXACLCYCLOPENTADIEN	3	0	0	3	0	0	3	0	0
*TOTAL SCAN PESTICIDES & PCB	239	2	6	205	1	9	150	0	4
PHENOLICS									
PHENOLICS	7	0	4	7	1	3	.	.	.
*TOTAL SCAN PHENOLICS	7	0	4	7	1	3	0	0	0
SPECIFIC PESTICIDES									
TOXAPHENE	7	0	0	6	0	0	7	0	0
2,4,5-T	2	0	0	2	0	0	.	.	.
2,4-D	2	0	0	2	0	0	.	.	.
2,4-DB	2	0	0	2	0	0	.	.	.
2,4 D PROPIONIC ACID	2	0	0	2	0	0	.	.	.
DICAMBA	1	0	0	1	0	0	.	.	.
PICHLORAM	0	0	0	0	0	0	.	.	.
SILVEX	2	0	0	2	0	0	.	.	.
DIAZINON	2	0	0	3	0	0	.	.	.
DICHLOROVOS	2	0	0	3	0	0	.	.	.
CHLORPYRIFOS	2	0	0	3	0	0	.	.	.
ETHION	2	0	0	3	0	0	.	.	.
AZINPHOS-METHYL	0	0	0	0	0	0	.	.	.
MALATHION	2	0	0	3	0	0	.	.	.
MEVINPHOS	2	0	0	3	0	0	.	.	.
METHYL PARATHION	2	0	0	3	0	0	.	.	.
METHYLTRITHION	2	0	0	3	0	0	.	.	.
PARATHION	2	0	0	3	0	0	.	.	.
PHORATE	1	0	0	2	0	0	.	.	.
RELDAN	2	0	0	3	0	0	.	.	.
RONNEL	2	0	0	3	0	0	.	.	.
AMINOCARB	0	0	0	0	0	0	.	.	.
BENOMYL	0	0	0	0	0	0	.	.	.
BUX	0	0	0	0	0	0	.	.	.
CARBOFURAN	2	0	0	3	0	0	.	.	.
CICP	2	0	0	3	0	0	.	.	.
DIALLATE	2	0	0	3	0	0	.	.	.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS)
SUMMARY TABLE OF RESULTS (1990)

SCAN PARAMETER	RAW			TREATED			SITE 1		
	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE	TOTAL	POSITIVE	TRACE
EPTAM	2	0	0	3	0	0	.	.	.
IPC	2	0	0	3	0	0	.	.	.
PROPOXUR	2	0	0	3	0	0	.	.	.
CARBARYL	2	0	0	3	0	0	.	.	.
BUTYLATE	2	0	0	3	0	0	.	.	.
*TOTAL SCAN SPECIFIC PESTICIDES	57	0	0	76	0	0	7	0	0
VOLATILES									
BENZENE	7	0	0	7	0	0	7	0	3
TOLUENE	7	0	1	7	0	0	7	3	2
ETHYLBENZENE	7	0	0	7	0	0	7	0	7
P-XYLENE	7	0	0	7	0	0	7	0	0
M-XYLENE	7	0	0	7	0	0	7	0	7
O-XYLENE	7	0	0	7	0	0	7	0	6
STYRENE	7	0	4	7	0	0	7	0	1
1,1 DICHLOROETHYLENE	7	0	0	7	0	0	7	0	0
METHYLENE CHLORIDE	7	0	0	7	0	0	7	0	0
T1,2DICHLOROETHYLENE	7	0	0	7	0	0	7	0	1
1,1 DICHLOROETHANE	7	0	0	7	0	0	7	0	0
CHLOROFORM	7	0	0	7	7	0	7	7	0
111, TRICHLOROETHANE	7	0	0	7	0	0	7	0	0
1,2 DICHLOROETHANE	7	0	0	7	0	0	7	0	0
CARBON TETRACHLORIDE	7	0	0	7	0	0	7	0	0
1,2 DICHLOROPROPANE	7	0	0	7	0	0	7	0	0
TRICHLOROETHYLENE	7	0	0	7	0	0	7	0	0
DICHLOROBROMOMETHANE	7	0	0	7	7	0	7	7	0
112 TRICHLOROETHANE	7	0	0	7	0	0	7	0	0
CHLORODIBROMOMETHANE	7	0	0	7	7	0	7	6	1
T-CHLOROETHYLENE	7	0	0	7	0	0	7	0	1
BROMOFORM	7	0	0	7	0	3	7	0	4
1122 T-CHLOROETHANE	7	0	0	7	0	0	7	0	0
CHLOROBENZENE	7	0	0	7	0	0	7	0	0
1,4 DICHLOROBENZENE	7	0	0	7	0	0	7	0	0
1,3 DICHLOROBENZENE	7	0	0	7	0	0	7	0	0
1,2 DICHLOROBENZENE	7	0	0	7	0	0	7	0	0
ETHLYENE DIBROMIDE	7	0	0	7	0	0	7	0	0
TOTL TRIHALOMETHANES	7	0	0	7	7	0	7	7	0
*TOTAL SCAN VOLATILES	203	0	5	203	28	3	203	30	33
*TOTAL GROUP ORGANIC	734	2	15	705	30	17	475	30	38

KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

LABORATORY RESULTS, REMARK DESCRIPTIONS

.	No Sample Taken
BDL	Below Minimum Measurement Amount
<T	Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE)
>	Results Are Greater Than The Upper Limit
<=>	Approximate Result
!CS	No Data: Contamination Suspected
!IL	No Data: Sample Incorrectly Labelled
!IS	No Data: Insufficient Sample
!IV	No Data: Inverted Septum
!LA	No Data: Laboratory Accident
!LD	No Data: Test Queued After Sample Discarded
!NA	No Data: No Authorization To Perform Reanalysis
!NP	No Data: No Procedure
!NR	No Data: Sample Not Received
!OP	No Data: Obscured Plate
!QU	No Data: Quality Control Unacceptable
!PE	No Data: Procedural Error - Sample Discarded
!PH	No Data: Sample pH Outside Valid Range
!RE	No Data: Received Empty
!RO	No Data: See Attached Report (no numeric results)
!SH	No Data: Sample Missing
!SS	No Data: Send Separate Sample Properly Preserved
!UI	No Data: Indeterminant Interference
!TX	No Data: Time Expired
A3C	Approximate, Total Count Exceeded 300 Colonies
APL	Additional Peak, Large, Not Priority Pollutant
APS	Additional Peak, Less Than, Not Priority Pollutant
CIC	Possible Contamination, Improper Cap
CRO	Calculated Result Only
PPS	Test Performed On Preserved Sample
RMP	P and M-Xylene Not Separated
RRV	Rerun Verification
RVU	Reported Value Unusual
SPS	Several Peaks, Small, Not Priority Pollutant

UCR	Unreliable: Could Not Confirm By Reanalysis
UCS	Unreliable: Contamination Suspected
UIN	Unreliable: Indeterminate Interference
XP	Positive After X Number Of Hours
T#	(T06) Result Taken After # Hours

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
BACTERIOLOGICAL				
FECAL COLIFORM MF (CT/100ML)		**DET'N LIMIT = 0**		**GUIDELINE = 0 (A1)**
JUN	BDL	.	.	.
JUL	BDL	.	.	.
SEP	16	.	.	.
OCT	2	.	.	.
NOV	BDL	.	.	.
DEC	10 <=>	.	.	.
STANDRD PLATE CNT MF (COUNTS/ML)		**DET'N LIMIT = 0**		**GUIDELINE = 500/ML (A3)**
JUN	.	0 <=>	.	2 <=>
JUL	.	0 <=>	.	77
SEP	.	3 <=>	.	10
OCT	.	4 <=>	.	11
NOV	.	0 <=>	.	0 <=>
DEC	.	0 <=>	.	9 <=>
TOTAL COLIFORM MF (CT/100ML)		**DET'N LIMIT = 0**		**GUIDELINE = 5/100ML(A1)**
JUN	BDL	.	.	.
JUL	80 <=>	.	.	.
SEP	370	.	.	.
OCT	20 <=>	.	.	.
NOV	200	.	.	.
DEC	BDL	.	.	.
T COLIFORM BCKGRD MF (CT/100ML)		**DET'N LIMIT = 0**		**GUIDELINE = N/A**
JUN	24000 >	.	.	.
JUL	24000 >	.	.	.
SEP	24000 >	.	.	.
OCT	2500	.	.	.
NOV	11000	.	.	.
DEC	2400	.	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (FLD)				
FLD CHLORINE (COMB) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
JUN	.	.200	.	.200
SEP	.	.100	.000	.000
OCT	.	.000	.000	.000
NOV	.	.500	.100	.100
DEC	.	.100	.400	.400
FLD CHLORINE FREE (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
JUN	.	1.300	.	1.300
JUL	.	1.200	.100	1.000
SEP	.	1.400	1.000	1.000
OCT	.	1.500	1.500	1.500
NOV	.	1.500	1.700	1.700
DEC	.	.700	.300	.300
FLD CHLORINE (TOTAL) (MG/L)			DET'N LIMIT = 0	GUIDELINE = N/A
JUN	.	1.500	.	1.500
JUL	.	1.200	.	.
SEP	.	1.500	1.000	1.000
OCT	.	1.500	1.500	1.500
NOV	.	2.000	1.800	1.800
DEC	.	.800	.700	.700
FLD PH (DMNSLESS)			DET'N LIMIT = N/A	GUIDELINE = 6.5-8.5(A4)
JUN	8.300	7.800	.	7.200
JUL	8.600	7.600	7.600	7.600
SEP	8.880	7.880	7.800	7.800
OCT	8.700	8.000	8.000	8.000
NOV	8.600	7.900	7.200	.
DEC	8.140	8.140	8.330	8.330
FLD TEMPERATURE (DEG.C)			DET'N LIMIT = N/A	GUIDELINE = 15 (A3)
JUN	20.800	20.300	.	19.000
JUL	25.000	24.000	23.000	.
SEP	15.000	16.000	16.000	16.000
OCT	13.000	13.000	13.000	13.000
NOV	7.500	8.000	7.000	8.500
DEC	5.500	7.600	8.400	8.400
FLD TURBIDITY (FTU)			DET'N LIMIT = N/A	GUIDELINE = 1 (A1)
JUN	9.000	.120	.	.220
JUL	8.400	.100	.100	.100
SEP	31.000	.070	.070	.070
OCT	10.000	.060	.060	.060
NOV	10.120	.120	.120	.
DEC	22.000	.210	.420	.420

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHEMISTRY (LAB)				
ALKALINITY (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 30-500 (A4)
JUN	87.000	74.400	.	72.700
JUL	97.200	77.400	82.500	82.300
SEP	86.400	74.000	IUR	74.500
OCT	98.800	82.800	85.000	85.800
NOV	.	100.400	98.500	98.900
DEC	112.100	97.900	99.800	99.900
CALCIUM (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 100 (F2)
JUN	30.700	29.700	.	31.100
JUL	36.000	33.800	34.800	35.200
SEP	32.800	34.400	34.200	35.400
OCT	37.300	39.000	39.500	39.300
NOV	.	43.200	41.800	41.800
DEC	42.800	43.000	41.800	42.400
CYANIDE (MG/L)			DET'N LIMIT = 0.001	GUIDELINE = .2 (A1)
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	.002 <T	.	.
NOV	BDL	BDL	.	.
DEC	BDL	.003 <T	.	.
CHLORIDE (MG/L)			DET'N LIMIT = 0.2	GUIDELINE = 250 (A3)
JUN	8.700	9.200	.	10.600
JUL	18.800	20.100	19.800	19.800
SEP	12.600	16.000	15.400	15.700
OCT	13.800	19.300	18.000	17.900
NOV	.	15.200	13.000	14.400
DEC	12.500	14.500	13.500	13.400
COLOUR (HZU)			DET'N LIMIT = 0.5	GUIDELINE = 5 (A3)
JUN	1.500 <T	.500 <T	.	BDL
JUL	4.500	.500 <T	1.000 <T	1.000 <T
SEP	4.500	.500 <T	BDL	.500 <T
OCT	5.000	BDL	.500 <T	.500 <T
NOV	.	.500 <T	1.000 <T	BDL
DEC	4.000	2.000 <T	1.500 <T	2.000 <T
CONDUCTIVITY (UMHO/CM)			DET'N LIMIT = 1.	GUIDELINE = 400 (F2)
JUN	233	243	.	244
JUL	325	310	319	319
SEP	252	277	IUR	277
OCT	293	315	312	313
NOV	.	2	329	333
DEC	309	320	318	318

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
DISS ORG CARBON (MG/L)			**DET'N LIMIT = .100**	**GUIDELINE = 5.0 (A3)**
JUN	1.600	1.200	.	1.300
JUL	2.700	1.800	1.800	1.900
SEP	2.000	1.800	1.700	1.700
OCT	2.400	2.000	1.800	1.900
NOV	.	1.900	1.800	1.800
DEC	2.300	1.900	1.900	1.900
FLUORIDE (MG/L)			**DET'N LIMIT = 0.01**	**GUIDELINE = 2.4 (A1)**
JUN	.080	.080	.	.080
JUL	.140	.120	.120	.120
SEP	.080	.080	.060	.080
OCT	.120	.100	.100	.100
NOV	.	.080	.080	.080
DEC	.100	.060	.100	.080
HARDNESS (MG/L)			**DET'N LIMIT = 0.5**	**GUIDELINE = 80-100 (A4)**
JUN	109.900	107.300	.	111.200
JUL	133.000	126.000	130.000	131.000
SEP	116.000	120.000	120.000	123.000
OCT	133.900	138.700	140.500	139.700
NOV	.	148.000	144.000	145.000
DEC	147.000	148.000	146.000	146.000
IONCAL (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = N/A**
JUN	2.542	.442	.	2.527
JUL	2.872	1.356	2.948	2.005
SEP	3.014	.711	.000	.010
OCT	2.421	1.214	2.936	1.384
NOV	.	.951	.547	.346
DEC	.253	.194	1.626	1.337
LANGELIERS INDEX (DMNSLESS)			**DET'N LIMIT = N/A**	**GUIDELINE = N/A**
JUN	.354	.178	.	.187
JUL	.360	-.155	.035	-.051
SEP	.302	.046	.490	.021
OCT	.350	.086	.084	.135
NOV	.	.552	.530	.522
DEC	.459	.061	.107	.084
MAGNESIUM (MG/L)			**DET'N LIMIT = 0.1**	**GUIDELINE = 30 (F2)**
JUN	8.100	8.050	.	8.150
JUL	10.500	10.000	10.400	10.400
SEP	8.400	8.400	8.400	8.300
OCT	9.900	10.000	10.150	10.050
NOV	.	9.700	9.600	9.800
DEC	9.600	9.700	10.000	9.700

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
SODIUM (MG/L)		DET'N LIMIT = 0.2		GUIDELINE = 200 (A4)
JUN	5.200	5.300	.	5.300
JUL	9.800	9.600	9.400	9.800
SEP	6.400	7.000	7.000	7.000
OCT	6.800	7.100	7.000	7.000
NOV	.	7.800	7.400	7.600
DEC	5.600	6.000	6.000	6.000
AMMONIUM TOTAL (MG/L)		DET'N LIMIT = 0.002		GUIDELINE = 0.05 (F2)
JUN	BDL	BDL	.	BDL
JUL	BDL	.004 <T	.002 <T	BDL
SEP	BDL	BDL	.008 <T	.002 <T
OCT	.016	.002 <T	.002 <T	BDL
NOV	.	BDL	BDL	BDL
DEC	BDL	.004 <T	.022	.018
NITRITE (MG/L)		DET'N LIMIT = 0.001		GUIDELINE = 1 (A1)
JUN	.011	.007	.	.002 <T
JUL	BDL	BDL	.001 <T	.001 <T
SEP	.002 <T	BDL	BDL	BDL
OCT	.005	BDL	BDL	BDL
NOV	.	BDL	BDL	BDL
DEC	.009	BDL	.002 <T	.001 <T
TOTAL NITRATES (MG/L)		DET'N LIMIT = 0.005		GUIDELINE = 10 (A1)
JUN	.405	.455	.	.460
JUL	BDL	1.250	1.490	1.480
SEP	.635	.725	IUR	1.490
OCT	.960	1.110	1.100	1.110
NOV	.	1.730	1.540	1.590
DEC	1.640	1.660	1.630	1.660
NITROGEN TOT KJELD (MG/L)		DET'N LIMIT = 0.02		GUIDELINE = N/A
JUN	.210	.110	.	.100
JUL	.530	.180	.220	.220
SEP	.270	.110	.270	.170
OCT	.340	.170	.170	.190
NOV	.	.210	.100	.160
DEC	.300	.210	.220	.210
PH (DIMNSLESS)		DET'N LIMIT = N/A		GUIDELINE = 6.5-8.5(A4)
JUN	8.340	8.250	.	8.250
JUL	8.260	7.870	8.020	7.930
SEP	8.270	8.070	IUR	8.030
OCT	8.220	8.020	8.000	8.050
NOV	.	8.360	8.360	8.350
DEC	8.220	7.880	7.930	7.900

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PHOSPHORUS FIL REACT (MG/L)			**DET'N LIMIT = 0.0005**	**GUIDELINE = N/A**
JUN	.002 <T	.061	.	.
JUL	.001 <T	BDL	.	.
SEP	.004	BDL	.	.
OCT	.010	.001 <T	.	.
NOV	.	BDL	.	.
DEC	.005	BDL	.	.
PHOSPHORUS TOTAL (MG/L)			**DET'N LIMIT = 0.002**	**GUIDELINE = .40 (F2)**
JUN	.021	BDL	.	.
JUL	.053	.004 <T	.	.
SEP	.043	.003 <T	.	.
OCT	.018	.003 <T	.	.
NOV	.	BDL	.	.
DEC	.024	.003 <T	.	.
SULPHATE (MG/L)			**DET'N LIMIT = .200**	**GUIDELINE = 500 (A3)**
JUN	16.790	29.060	.	29.120
JUL	25.270	36.670	37.240	37.940
SEP	19.260	34.110	44.570	34.360
OCT	22.520	36.590	35.370	36.050
NOV	.	36.680	35.210	35.340
DEC	22.380	34.910	35.090	34.830
TURBIDITY (FTU)			**DET'N LIMIT = 0.05**	**GUIDELINE = 1 (A1)**
JUN	12.000	.110	.	.210
JUL	19.000	.290	.650	.440
SEP	74.000	.360	.290	.340
OCT	11.600	.230	.320	.270
NOV	.	.390	.470	.490
DEC	11.300	.710	.690	.780

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
METALS				
SILVER (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 50 (A1)
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.100 <T	.130 <T
DEC	BDL	BDL	BDL	BDL
ALUMINUM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 100 (A4)
JUN	110.000	61.000	.	50.000
JUL	140.000	93.000	100.000	91.000
SEP	420.000	38.000	37.000	40.000
OCT	150.000	30.000	32.000	31.000
NOV	150.000	2.100	32.000	31.000
DEC	50.000	46.000	65.000	68.000
ARSENIC (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 25 (A1)
JUN	.700 <T	.250 <T	.	.140 <T
JUL	1.000 <T	.160 <T	.220 <T	.200 <T
SEP	1.000 <T	.220 <T	.260 <T	.350 <T
OCT	.780 <T	.200 <T	.290 <T	.190 <T
NOV	.950 <T	BDL	.330 <T	.410 <T
DEC	.510 <T	.170 <T	.150 <T	.180 <T
BARIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 1000 (A2)
JUN	16.000	16.000	.	16.000
JUL	25.000	23.000	23.000	23.000
SEP	25.000	18.000	19.000	19.000
OCT	20.000	19.000	19.000	18.000
NOV	19.000	2.700	19.000	19.000
DEC	18.000	17.000	17.000	17.000
BORON (UG/L)			DET'N LIMIT = 2.00	GUIDELINE = 5000 (A1)
JUN	15.000 <T	20.000 <T	.	21.000
JUL	40.000	37.000	37.000	36.000
SEP	39.000	25.000	31.000	29.000
OCT	23.000	22.000	23.000	22.000
NOV	20.000 <T	17.000 <T	24.000	20.000 <T
DEC	19.000 <T	23.000	18.000 <T	18.000 <T
BERYLLIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 6800 (D4)
JUN	BDL	BDL	.	BDL
JUL	.070 <T	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CADMIUM (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	BDL	BDL
SEP	BDL	BDL	BDL	BDL
OCT	BDL	BDL	BDL	BDL
NOV	BDL	BDL	.090 <T	BDL
DEC	BDL	BDL	BDL	BDL
COBALT (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = N/A
JUN	.200 <T	.160 <T	.	.140 <T
JUL	.160 <T	.110 <T	.200 <T	.070 <T
SEP	.620 <T	.140 <T	.090 <T	.110 <T
OCT	.220 <T	.150 <T	.150 <T	.140 <T
NOV	.250 <T	.040 <T	.790 <T	2.100
DEC	BDL	.130 <T	.150 <T	.080 <T
CHROMIUM (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 50 (A1)
JUN	.930 <T	1.800 <T	.	2.000 <T
JUL	2.400 <T	1.800 <T	1.600 <T	1.600 <T
SEP	4.600 <T	.920 <T	2.100 <T	1.700 <T
OCT	1.500 <T	BDL	1.200 <T	BDL
NOV	1.000 <T	BDL	.910 <T	BDL
DEC	1.100 <T	2.100 <T	BDL	BDL
COPPER (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 1000 (A3)
JUN	6.500	1.000 <T	.	15.000
JUL	13.000	1.800 <T	6.600	2.700 <T
SEP	6.800	1.300 <T	3.200 <T	2.800 <T
OCT	9.100	1.500 <T	2.700 <T	4.700 <T
NOV	7.500	3.200 <T	31.000	2.900 <T
DEC	4.000 <T	1.300 <T	5.700	2.000 <T
IRON (UG/L)			DET'N LIMIT = 6.00	GUIDELINE = 300 (A3)
JUN	170.000	BDL	.	BDL
JUL	220.000	BDL	BDL	BDL
SEP	640.000	BDL	BDL	BDL
OCT	220.000	BDL	BDL	BDL
NOV	230.000	BDL	BDL	BDL
DEC	23.000 <T	8.100 <T	6.700 <T	7.200 <T
MERCURY (UG/L)			DET'N LIMIT = 0.02	GUIDELINE = 1 (A1)
JUN	BDL	BDL	.	.
JUL	BDL	BDL	.	.
SEP	BDL	BDL	.	.
OCT	BDL	BDL	.	.
NOV	.150	.270	.	.
DEC	BDL	BDL	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
MANGANESE (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 50 (A3)**
JUN	7.300	.370 <T	.	.310 <T
JUL	8.300	.400 <T	.420 <T	.340 <T
SEP	38.000	.380 <T	.240 <T	.200 <T
OCT	6.900	.230 <T	.270 <T	.260 <T
NOV	7.000	BDL	3.300	.310 <T
DEC	.230 <T	1.400	1.600	1.500
MOLYBDENUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = N/A**
JUN	.360 <T	.710	.	.640
JUL	1.200	1.300	1.300	1.300
SEP	.300 <T	1.100	1.200	1.100
OCT	.770	1.200	1.100	1.100
NOV	.730	1.100	.960	.920
DEC	.820	.770	.830	.800
NICKEL (UG/L)			**DET'N LIMIT = 0.20**	**GUIDELINE = 350 (D3)**
JUN	BDL	BDL	.	.240 <T
JUL	BDL	BDL	BDL	BDL
SEP	1.900 <T	BDL	.690 <T	.770 <T
OCT	1.200 <T	.870 <T	.790 <T	.800 <T
NOV	.660 <T	BDL	.500 <T	.350 <T
DEC	.280 <T	.550 <T	.680 <T	.380 <T
LEAD (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 10. (A1)**
JUN	.520	.080 <T	.	3.700
JUL	1.700	.100 <T	1.200	.540
SEP	1.800	BDL	.220 <T	.390 <T
OCT	.440 <T	BDL	.340 <T	.800
NOV	.560	BDL	3.200	.320 <T
DEC	BDL	.090 <T	.540	.160 <T
ANTIMONY (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 146 (D4)**
JUN	.430 <T	.650	.	.500 <T
JUL	.400 <T	.520	.600	.360 <T
SEP	.250 <T	.590	.560	.490 <T
OCT	.430 <T	.530	.540	.540
NOV	.420 <T	.860	.630	7.800
DEC	.410 <T	.520	.570	.500 <T
SELENIUM (UG/L)			**DET'N LIMIT = 1.00**	**GUIDELINE = 10 (A1)**
JUN	BDL	1.300 <T	.	BDL
JUL	BDL	BDL	BDL	BDL
SEP	BDL	1.200 <T	2.300 <T	1.500 <T
OCT	BDL	BDL	BDL	1.100 <T
NOV	BDL	BDL	BDL	BDL
DEC	BDL	BDL	BDL	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
STRONTIUM (UG/L)			**DET'N LIMIT = 0.10**	**GUIDELINE = N/A**
JUN	110.000	110.000	.	110.000
JUL	250.000	230.000	250.000	240.000
SEP	150.000	150.000	150.000	150.000
OCT	150.000	160.000	160.000	160.000
NOV	150.000	56.000	160.000	160.000
DEC	140.000	140.000	140.000	140.000
TITANIUM (UG/L)			**DET'N LIMIT = 0.50**	**GUIDELINE = N/A**
JUN	5.000 <T	3.600 <T	.	3.700 <T
JUL	7.100	4.700 <T	5.000 <T	5.500
SEP	5.300	3.300 <T	3.400 <T	3.400 <T
OCT	3.800 <T	2.000 <T	1.700 <T	1.700 <T
NOV	6.600	1.900 <T	3.800 <T	3.500 <T
DEC	5.000 <T	3.600 <T	3.600 <T	3.300 <T
URANIUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = 100 (A1)**
JUN	.230 <T	BDL	.	BDL
JUL	.500 <T	.070 <T	.090 <T	.060 <T
SEP	.380 <T	BDL	.070 <T	.070 <T
OCT	.550	.080 <T	.100 <T	.100 <T
NOV	.500 <T	.170 <T	.160 <T	.160 <T
DEC	.500 <T	.180 <T	.200 <T	.240 <T
VANADIUM (UG/L)			**DET'N LIMIT = 0.05**	**GUIDELINE = N/A**
JUN	.530	.250 <T	.	.210 <T
JUL	.980	.430 <T	.510	.520
SEP	1.500	.310 <T	.330 <T	.300 <T
OCT	.650	.200 <T	.190 <T	.190 <T
NOV	.560	.060 <T	.180 <T	.160 <T
DEC	.340 <T	.170 <T	.210 <T	.170 <T
ZINC (UG/L)			**DET'N LIMIT = 0.20**	**GUIDELINE = 5000 (A3)**
JUN	6.400	2.000 <T	.	3.300
JUL	8.200	3.100	9.800	4.100
SEP	9.600	1.800 <T	6.500	4.500
OCT	5.200	2.400	3.500	9.100
NOV	5.800	1.800 <T	26.000	9.000
DEC	1.300 <T	1.400 <T	8.500	2.400

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHLOROAROMATICS				
HEXACHLOROETHANE (NG/L)		DET'N LIMIT = 1.000		GUIDELINE = 1900 (D4)
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
SEP	BDL	ILA	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	5.000 <T	.	3.000 <T
DEC	BDL	9.000 <T	.	BDL

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
PESTICIDES & PCB				
ALPHA BHC (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 700 (G)
JUN	1.000 <T	2.000 <T	.	1.000 <T
JUL	BDL	1.000 <T	.	BDL
SEP	BDL	ILA	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	1.000 <T	.	2.000 <T
DEC	BDL	2.000 <T	.	1.000 <T
LINDANE (NG/L)			DET'N LIMIT = 1.000	GUIDELINE = 4000 (A1)
JUN	BDL	BDL	.	BDL
JUL	BDL	BDL	.	BDL
SEP	BDL	ILA	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	1.000 <T
DEC	BDL	BDL	.	BDL
ATRAZINE (NG/L)			DET'N LIMIT = 50	GUIDELINE = 60000 (A2)
JUN	80.000 <T	90.000 <T	.	.
JUL	840.000	670.000	.	.
SEP	120.000 <T	130.000 <T	.	.
OCT	190.000 <T	60.000 <T	.	.
NOV	BDL	250.000 <T	.	.
DEC	190.000 <T	90.000 <T	.	.

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM		
	RAW	TREATED	SITE 1		
			STANDING	FREE FLOW	
PHENOLICS (UG/L)	PHENOLICS		DET'N LIMIT = 0.2	GUIDELINE = 2	(A4)
JUN	BDL	BDL	.	.	
JUL	.400 <T	BDL	.	.	
SEP	BDL	1.600	.	.	
OCT	.400 <T	BDL	.	.	
NOV	BDL	.600 <T	.	.	
DEC	.600 <T	.600 <T	.	.	

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
VOLATILES				
BENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (A1)
JUN	BDL	BDL	.	.050 <T
JUL	BDL	BDL	.	.100 <T
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
TOLUENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 24 (A3)
JUN	.100 <T	BDL	.	.500
JUL	BDL	BDL	.	1.250
SEP	BDL	BDL	.	.400 <T
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	.100 <T
ETHYLBENZENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 2.4 (A3)
JUN	BDL	BDL	.	.100 <T
JUL	BDL	BDL	.	.250 <T
SEP	BDL	BDL	.	.100 <T
OCT	BDL	BDL	.	.100 <T
NOV	BDL	BDL	.	.050 <T
DEC	BDL	BDL	.	.100 <T
M-XYLENE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 300 (A3*)
JUN	BDL	BDL	.	.200 <T
JUL	BDL	BDL	.	.900 <T
SEP	BDL	BDL	.	.300 <T
OCT	BDL	BDL	.	.200 <T
NOV	BDL	BDL	.	.200 <T
DEC	BDL	BDL	.	.100 <T
O-XYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 300 (A3*)
JUN	BDL	BDL	.	.100 <T
JUL	BDL	BDL	.	.300 <T
SEP	BDL	BDL	.	.100 <T
OCT	BDL	BDL	.	.100 <T
NOV	BDL	BDL	.	.050 <T
DEC	BDL	BDL	.	BDL
STYRENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 100 (D1)
JUN	.050 <T	BDL	.	BDL
JUL	.050 <T	BDL	.	BDL
SEP	.050 <T	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	.100 <T

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM STONEY POINT (TILBURY NORTH WSS) 1990

	WATER TREATMENT PLANT		DISTRIBUTION SYSTEM	
	RAW	TREATED	SITE 1	
			STANDING	FREE FLOW
CHLOROFORM (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
JUN	BDL	11.100	.	21.200
JUL	BDL	36.800	.	24.800
SEP	BDL	27.900	.	34.500
OCT	BDL	42.300	.	44.100
NOV	BDL	25.100	.	25.300
DEC	BDL	29.600	.	5.300
DICHLOROBROMOMETHANE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 350 (A1+)
JUN	BDL	7.950	.	10.900
JUL	BDL	14.200	.	12.650
SEP	BDL	11.650	.	13.450
OCT	BDL	13.600	.	14.900
NOV	BDL	11.600	.	12.300
DEC	BDL	11.050	.	2.700
CHLORODIBROMOMETHANE (UG/L)			DET'N LIMIT = 0.10	GUIDELINE = 350 (A1+)
JUN	BDL	4.000	.	4.000
JUL	BDL	4.900	.	4.900
SEP	BDL	3.400	.	3.700
OCT	BDL	3.000	.	3.200
NOV	BDL	3.400	.	3.900
DEC	BDL	2.400	.	.700 <T
T-CHLOROETHYLENE (UG/L)			DET'N LIMIT = 0.05	GUIDELINE = 5 (D1)
JUN	BDL	BDL	.	.050 <T
JUL	BDL	BDL	.	BDL
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	BDL
DEC	BDL	BDL	.	BDL
BROMOFORM (UG/L)			DET'N LIMIT = 0.20	GUIDELINE = 350 (A1+)
JUN	BDL	.400 <T	.	.400 <T
JUL	BDL	.400 <T	.	.400 <T
SEP	BDL	BDL	.	BDL
OCT	BDL	BDL	.	BDL
NOV	BDL	BDL	.	.200 <T
DEC	BDL	BDL	.	BDL
TOTL TRIHALOMETHANES (UG/L)			DET'N LIMIT = 0.50	GUIDELINE = 350 (A1)
JUN	BDL	23.500	.	36.500
JUL	BDL	56.300	.	42.750
SEP	BDL	42.950	.	51.600
OCT	BDL	58.850	.	62.150
NOV	BDL	40.150	.	41.700
DEC	BDL	43.050	.	8.650

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
BACTERIOLOGICAL			
FECAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	0 (A1)
STANDARD PLATE COUNT MEMBRANE FILT.	CT/ML	0	500/ML (A3)
TOTAL COLIFORM BACKGROUND MF	CT/100ML	0	N/A
TOTAL COLIFORM MEMBRANE FILTRATION	CT/100ML	0	5/100ML (A1)
CHEMISTRY (FLD)			
FIELD COMBINED CHLORINE RESIDUAL	MG/L	0	N/A
FIELD TOTAL CHLORINE RESIDUAL	MG/L	0	N/A
FIELD FREE CHLORINE RESIDUAL	MG/L	0	N/A
FIELD PH	DMNSLESS	N/A	6.5-8.5 (A3)
FIELD TEMPERATURE	DEG.C	N/A	15.0 (A3)
FIELD TURBIDITY	FTU	N/A	1.0 (A1)
CHEMISTRY (LAB)			
ALKALINITY	MG/L	0.2	30-500 (A3)
AMMONIUM TOTAL	MG/L	0.002	0.05 (F2)
CALCIUM	MG/L	0.2	100 (F2)
CHLORIDE	MG/L	0.2	250 (A3)
COLOUR	TCU	0.5	5.0 (A3)
CONDUCTIVITY	UMHO/CM	1.0	400 (F2)
CYANIDE	MG/L	0.001	0.2 (A1)
DISSOLVED ORGANIC CARBON	MG/L	0.1	5.0 (A3)
FLUORIDE	MG/L	0.01	2.4 (A1)
HARDNESS	MG/L	0.5	80-100 (A4)
LANGELIERS INDEX	DMNSLESS	N/A	N/A
MAGNESIUM	MG/L	0.1	30.0 (F2)
NITRITE	MG/L	0.001	1.0 (A1)
NITROGEN TOTAL KJELDAHL	MG/L	0.02	N/A
PH	DMNSLESS	N/A	6.5-8.5 (A4)
PHOSPHORUS FIL REACT	MG/L	0.0005	N/A
PHOSPHORUS TOTAL	MG/L	0.002	0.4 (F2)
SODIUM	MG/L	0.2	200 (A4)
SULPHATE	MG/L	0.2	500 (A3)
TOTAL NITRATES	MG/L	0.005	10.0 (A1)
TURBIDITY	FTU	0.05	1.0 (A1)
CHLOROAROMATICS			
123 TRICHLOROBENZENE	NG/L	5.0	N/A
1234 TETRACHLOROBENZENE	NG/L	1.0	N/A
1235 TETRACHLOROBENZENE	NG/L	1.0	N/A
124 TRICHLOROBENZENE	NG/L	5.0	10000 (I)
1245-TETRACHLOROBENZENE	NG/L	1.0	38000 (D4)
135 TRICHLOROBENZENE	NG/L	5.0	N/A
236 TRICHLOROTOLUENE	NG/L	5.0	N/A
245 TRICHLOROTOLUENE	NG/L	5.0	N/A
26A TRICHLOROTOLUENE	NG/L	5.0	N/A
HEXACHLOROBENZENE	NG/L	1.0	10 (C1)
HEXACHLOROBUTADIENE	NG/L	1.0	450 (D4)
HEXACHLOROCYCLOPENTADIENE	NG/L	5.0	206000 (D4)
HEXACHLOROETHANE	NG/L	1.0	1900 (D4)
OCTACHLOROSTYRENE	NG/L	1.0	N/A
PENTACHLOROBENZENE	NG/L	1.0	74000 (D4)
CHLOROPHENOLS			
234 TRICHLOROPHENOL	NG/L	100.0	N/A
2345 TETRACHLOROPHENOL	NG/L	20.0	N/A
2356 TETRACHLOROPHENOL	NG/L	10.0	N/A

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
245 TRICHLOROPHENOL	NG/L	100.0	2600000 (D4)
246 TRICHLOROPHENOL	NG/L	20.0	5000 (A1)
PENTACHLOROPHENOL	NG/L	10.0	60000 (A1)
METALS			
ALUMINUM	UG/L	0.10	100 (A4)
ANTIMONY	UG/L	0.05	146 (D4)
ARSENIC	UG/L	0.10	25 (A1)
BARIUM	UG/L	0.05	1000 (A2)
BERYLLIUM	UG/L	0.05	6800 (D4)
BORON	UG/L	2.00	5000 (A1)
CADMIUM	UG/L	0.05	5 (A1)
CHROMIUM	UG/L	0.50	50 (A1)
COBALT	UG/L	0.02	N/A
COPPER	UG/L	0.50	1000 (A3)
IRON	UG/L	6.00	300 (A3)
LEAD	UG/L	0.05	10 (A1)
MANGANESE	UG/L	0.05	50 (A3)
MERCURY	UG/L	0.02	1 (A1)
MOLYBDENUM	UG/L	0.05	N/A
NICKEL	UG/L	0.20	350 (D3)
SELENIUM	UG/L	1.00	10 (A1)
SILVER	UG/L	0.05	50 (A1)
STRONTIUM	UG/L	0.10	N/A
THALLIUM	UG/L	0.05	13 (D4)
TITANIUM	UG/L	0.50	N/A
URANIUM	UG/L	0.05	100 (A1)
VANADIUM	UG/L	0.05	N/A
ZINC	UG/L	0.20	5000 (A3)
PAH			
ANTHRACENE	NG/L	1.0	N/A
BENZO(A) ANTHRACENE	NG/L	20.0	N/A
BENZO(A) PYRENE	NG/L	5.0	10.0 (A1)
BENZO(B) CHRYSENE	NG/L	2.0	N/A
BENZO(B) FLUORANTHENE	NG/L	10.0	N/A
BENZO(E) PYRENE	NG/L	50.0	N/A
BENZO(G,H,I) PERYLENE	NG/L	20.0	N/A
BENZO(K) FLUORANTHENE	NG/L	1.0	N/A
CHRYSENE	NG/L	50.0	N/A
CORONENE	NG/L	10.0	N/A
DIBENZO(A,H) ANTHRACENE	NG/L	10.0	N/A
DIMETHYL BENZO(A) ANTHRACENE	NG/L	5.0	N/A
FLUORANTHENE	NG/L	20.0	42000.0 (D4)
INDENO(1,2,3-C,D) PYRENE	NG/L	20.0	N/A
PERYLENE	NG/L	10.0	N/A
PHENANTHRENE	NG/L	10.0	N/A
PYRENE	NG/L	20.0	N/A
PESTICIDES & PCB			
ALACHLOR (LASSO)	NG/L	500.0	5000 (A2)
ALDRIN	NG/L	1.0	700 (A1)
ALPHA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	700 (G)
ALPHA CHLORDANE	NG/L	2.0	7000 (A1)
AMETRINE	NG/L	50.0	300000 (D3)
ATRATONE	NG/L	50.0	N/A
ATRAZINE	NG/L	50.0	60000 (A2)
DES ETHYL ATRAZINE	NG/L	200.0	60000 (A2)
BETA HEXACHLOROCYCLOHEXANE (BHC)	NG/L	1.0	300 (G)
CYANAZINE (BLADEX)	NG/L	100.0	10000 (A2)
O,P-DDD	NG/L	5.0	10 (I)
DIELDRIN	NG/L	2.0	700 (A1)
ENDOSULFAN 1 (THIODAN I)	NG/L	2.0	74000 (D4)
ENDOSULFAN 2 (THIODAN II)	NG/L	5.0	74000 (D4)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE	
ENDOSULFAN SULPHATE (THIODAN SULPHATE)	NG/L	5.0	N/A	
ENDRIN	NG/L	5.0	1600	(D3)
GAMMA CHLORDANE	NG/L	2.0	7000	(A1)
HEPTACHLOR	NG/L	1.0	3000	(A1)
HEPTACHLOR EPOXIDE	NG/L	1.0	3000	(A1)
LINDANE (GAMMA BHC)	NG/L	1.0	4000	(A1)
METHOXYCHLOR	NG/L	5.0	900000	(A1)
METOLACHLOR	NG/L	500.0	50000	(A2)
METRIBUZIN (SENCOR)	NG/L	100.0	80000	(A1)
MIREX	NG/L	5.0	N/A	
P,P-DDD	NG/L	5.0	N/A	
O,P-DDT	NG/L	5.0	30000	(A1)
OXYCHLORDANE	NG/L	2.0	N/A	
PCB	NG/L	20.0	3000	(A2)
PPDDE	NG/L	1.0	30000	(A1)
PPDDT	NG/L	5.0	30000	(A1)
PROMETONE	NG/L	50.0	52500	(D3)
PROMETRYNE	NG/L	50.0	1000	(A2)
PROPAZINE	NG/L	50.0	700000	(D3)
SIMAZINE	NG/L	50.0	10000	(A2)
D-ETHYL SIMAZINE	NG/L	200.0	10000	(A2)
TOXAPHENE	NG/L	500.0	5000	(A1)
PHENOLICS				
PHENOLICS (UNFILTERED REACTIVE)	UG/L	0.2	2	(A4)
SPECIFIC PESTICIDES				
2,4 D PROPIONIC ACID	NG/L	100.	N/A	
2,4,5-TRICHLOROPHENOXY ACETIC ACID	NG/L	50.	280000	(A1)
2,4-DICHLOROBUTYRIC ACID (2,4-D)	NG/L	100.	100000	(A1)
24-DICHLORORPHENOXYBUTYRIC ACID (24-DB)	NG/L	200.	18000	(B3)
BUTYLATE (SUTAN)	NG/L	2000.	245000	(D3)
CARBARYL (SEVIN)	NG/L	200.	90000	(A1)
CARBOFURAN	NG/L	2000.	90000	(A1)
CHLORPYRIFOS (DURSBAN)	NG/L	20.	N/A	
CICP (CHLORPROPHAM)	NG/L	2000.	350000	(G)
DIALLATE	NG/L	2000.	N/A	
DIAZINON	NG/L	20.	20000	(A1)
DICAMBA	NG/L	50.	120000	(A1)
DICHLOROVOS	NG/L	20.	N/A	
EPTAM	NG/L	2000.	N/A	
ETHION	NG/L	20.	35000	(G)
IPC	NG/L	2000.	N/A	
MALATHION	NG/L	20.	190000	(A1)
METHYL PARATHION	NG/L	50.	7000	(B3)
METHYLTRITHION	NG/L	20.	N/A	
MEVINPHOS	NG/L	20.	N/A	
PARATHION	NG/L	20.	50000	(A1)
PHORATE (THIMET)	NG/L	20.	2000	(A2)
PROPOXUR (BAYGON)	NG/L	2000.	140000	(D3)
RELDAN	NG/L	20.	N/A	
RONNEL	NG/L	20.	N/A	
SILVEX (2,4,5-TP)	NG/L	20.	10000	(A1)
VOLATILES				
1,1 DICHLOROETHANE	UG/L	0.10	N/A	
1,1 DICHLOROETHYLENE	UG/L	0.10	7	(D1)
1,2 DICHLOROBENZENE	UG/L	0.05	200	(A1)
1,2 DICHLOROETHANE	UG/L	0.05	5	(A1)

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

SCAN/PARAMETER	UNIT	DETECTION LIMIT	GUIDELINE
1,2 DICHLOROPROPANE	UG/L	0.05	5 (D1)
1,3 DICHLOROBENZENE	UG/L	0.10	3750 (D3)
1,4 DICHLOROBENZENE	UG/L	0.10	5 (A1)
111, TRICHLOROETHANE	UG/L	0.02	200 (D1)
112 TRICHLOROETHANE	UG/L	0.05	0.6 (D4)
1122 TETRACHLOROETHANE	UG/L	0.05	0.17(D4)
BENZENE	UG/L	0.05	5 (A1)
BROMOFORM	UG/L	0.20	350 (A1+)
CARBON TETRACHLORIDE	UG/L	0.20	5 (A1)
CHLOROBENZENE	UG/L	0.10	1510 (D3)
CHLORODIBROMOMETHANE	UG/L	0.10	350 (A1+)
CHLOROFORM	UG/L	0.10	350 (A1+)
DICHLOROBROMOMETHANE	UG/L	0.05	350 (A1+)
ETHLYENE DIBROMIDE	UG/L	0.05	50 (D1)
ETHYLBENZENE	UG/L	0.05	2.4 (A3)
M-XYLENE	UG/L	0.10	300 (A3*)
METHYLENE CHLORIDE	UG/L	0.50	50 (A1)
O-XYLENE	UG/L	0.05	300 (A3*)
P-XYLENE	UG/L	0.10	300 (A3*)
STYRENE	UG/L	0.05	100 (D1)
TETRACHLOROETHYLENE	UG/L	0.05	5 (D1)
TRANS 1,2 DICHLOROETHYLENE	UG/L	0.10	70 (D1)
TOLUENE	UG/L	0.05	24 (A3)
TOTAL TRIHALOMETHANES	UG/L	0.50	350 (A1)
TRICHLOROETHYLENE	UG/L	0.10	50 (A1)

Appendix A

DRINKING WATER SURVEILLANCE PROGRAM
PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY

All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

BENZENE (B2001P) VOLATILES

CLASS: HEALTH METHOD: P0C0D0 UNIT: µg/L

SOURCE	FROM	TO	METHOD	GUIDELINE	UNIT	NOTE
CAL C	85/01			0.700	µg/L	AL
CDWG C	87/01			5.000	µg/L	MAC
EPA C	87/07			5.000	µg/L	MCL
EPAA C	80/11			6.600	µg/L	AMBIENT **
FERC C	84/05			1.000	µg/L	MCL
WHO C	84/01			10.000	µg/L	GV

DESCRIPTION:**NAME:** BENZENE
CAS#: 71-43-2
MOLECULAR FORMULAE: C_6H_6
DETECTION LIMIT: (FOR METHOD POCODO) 0.05 µg/L
SYNONYMS: BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).
CHARACTERISTICS: COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).
PROPERTIES: SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE: 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).
SOURCES: COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.
USES: DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF

OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

TOXICITY: RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

CARCINOGENICITY: A KNOWN HUMAN CARCINOGEN.

REMOVAL: THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

ADDITIONAL PROPERTIES:
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

NOTES: EPA PRIORITY POLLUTANT.

Appendix B

DWSP SAMPLING GUIDELINE

i) Raw and Treated at Plant

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-220 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)
Volatiles (duplicates) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do not rinse bottle -fill bottle completely without bubbles
Organics (OWOC),(OWTRI),(OAPAHX)	-1 L amber glass bottle per scan -do not rinse bottle -fill to 2 cm from top -when 'special pesticides' are requested three extra bottles must be filled
Cyanide	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops sodium hydroxide (NaOH) (**Caution:** NaOH is corrosive)

Mercury	-250 mL glass bottle -rinse bottle and cap three times -fill to top of label -add 20 drops each nitric acid (HNO_3) and potassium dichromate ($K_2Cr_2O_7$) (**Caution:** HNO_3&$K_2Cr_2O_7$ are corrosive)
Phenols	-250 mL glass bottle -do <u>not</u> rinse bottle, preservative has been added -fill to top of label
Radionuclides (as scheduled)	-4 L plastic jug -do <u>not</u> rinse, carrier added -fill to 5 cm from top
Organic Characterization (GC/MS - once per year)	-1 L amber glass bottle; instructions as per organic -250 mL glass bottle -do <u>not</u> rinse bottle -fill completely without bubbles

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.

2. Record time of day on submission sheet.

3. Record temperature on submission sheet.

4. Fill up all bottles as per instructions.

5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

ii) Distribution Samples (standing water)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top

Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid (HNO_3) (**Caution:** HNO_3 is corrosive)

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

iii) Distribution Samples (free flow)

General Chemistry	-500 mL plastic bottle (PET 500) -rinse bottle and cap with sample water three times -fill to 2 cm from top
Bacteriological	-250 mL plastic bottle with white seal on cap -do not rinse bottle, preservative has been added -avoid touching bottle neck or inside of cap -fill to top of red label as marked
Metals	-500 mL plastic bottle (PET 500) -rinse bottle and cap three times -fill to 2 cm from top -add 10 drops nitric acid HNO_3 (**Caution:** HNO_3 is corrosive)

Volatiles (duplicate) (OPOPUP)	-45 mL glass vial with septum (teflon side must be in contact with sample) -do <u>not</u> rinse bottle, preservative has been added -fill bottle completely without bubbles
Organics (OWOC) (OAPAHX)	-1 L amber glass bottle per scan -do <u>not</u> rinse bottle -fill to 2 cm from top

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.